Claims:

1. An apparatus for processing substrates, comprising:

(a) one or more transfer chambers;

(b) a substrate handling member disposed in each of the one or more transfer chambers;

(c) one or more processing chambers, each processing chamber defining at least one isolated processing region therein, wherein each processing region is connected to the one or more transfer chambers;

(d) one or more loadlock chambers in communication with the one or more transfer chambers; and

(e) one or more multi-slot substrate pre-heating modules in communication with the one or more transfer chambers.

2. The apparatus of claim 1, further comprising one or more multi-slot cooling stations disposed within the loadlock chamber.

3. The apparatus of claim 1, further comprising a vacuum pump in fluid communication with the loadlock chamber.

4. The apparatus of claim 1, further comprising a vacuum pump in fluid communication with each processing region in the one or more processing chambers.

5. The apparatus of claim 1, wherein each processing chamber has two isolated processing regions.

6. The apparatus of claim 1, wherein each processing region includes a gas distribution assembly disposed therein and each gas distribution assembly shares process gases from one or more gas sources.

7. The apparatus of claim 1, further comprising a remote plasma system having an RF

generator connected to each processing region.

8. The apparatus of claim 1, wherein a remote plasma system is in fluid communication with each processing region.

9. The apparatus of claim 2, further comprising a high pressure deposition module connected to the one or more load lock chambers.

10. The apparatus of claim 9, wherein the high pressure deposition module is a spin-on dielectric module comprising one or more substrate stripping chambers.

11. The apparatus of claim 1, wherein the one or more multi-slot pre-heating modules are disposed within the loadlock chamber.

12. An apparatus for processing substrates, comprising:

(a) a high pressure deposition module;

(b) a first transfer chamber in communication with the high pressure deposition module;

(c) a loadlock chamber in communication with the first transfer chamber;

(d) a second transfer chamber in communication with the loadlock chamber;

(e) a multi-slot substrate pre-heating module in communication with the first transfer chamber;

(f) a substrate handling member disposed in the second transfer chamber; and

(g) one or more processing chambers, each processing chamber defining at least one isolated processing region therein, wherein each processing region is connected to the second transfer chamber.

13. The apparatus of claim 12, wherein the high pressure deposition module comprises:

(a) one or more substrate spinner chambers;

(b) one or more substrate curing chambers;

(c) one or more substrate stripping chambers;

(d) one or more silylation deposition chambers; and

(e) a second substrate handling member disposed in the high pressure deposition module.

14. The apparatus of claim 12, further comprising one or more multi-slot cooling stations disposed within each of the one or more loadlock chambers.

15. The apparatus of claim 12, further comprising a vacuum pump in fluid communication with the one or more loadlock chambers.

16. The apparatus of claim 12, further comprising a vacuum pump in fluid communication with each processing region.

17. The apparatus of claim 12, wherein each processing chamber has two isolated processing regions.

18. The apparatus of claim 12, wherein each processing region includes a gas distribution assembly disposed therein and each gas distribution assembly shares process gases from one or more gas sources.

19. The apparatus of claim 12, further comprising a remote plasma system having a RF generator connected to each processing region..

20. The apparatus of claim 19, wherein each substrate stripping chamber is an oxidation chamber.

21. The apparatus of claim 20, wherein the oxidation chamber and is connected to a remote plasma system having a RF generator or a microwave generator.

22. The apparatus of claim 12, wherein the multi-slot pre-heating module is disposed within the loadlock chamber.

23. A process for forming a mesoporous oxide film on a substrate, comprising:

a) forming a sol gel precursor comprising a silicon/oxygen compound, an organic solvent, water, and a surfactant;

b) depositing the sol gel precursor on the substrate;

c) curing the deposited sol gel precursor to form an oxide film; and

d) exposing the film to an oxidizing environment to form a mesoporous oxide film.

24. The process of claim 23, wherein the mesoporous oxide film comprises a structure of interconnected pores of uniform diameter.

25. The process of claim 24, wherein the mesoporous oxide film further comprises a cubic phase structure.

26. The process of claim 23, wherein the silicon/oxygen compound precursor is selected from the group consisting of tetraethylorthosililate, tetramethoxy silane, phenyltriethyloxy silane, methyltriethoxy silane, and combinations thereof.

27. The process of claim 23, wherein the organic solvent is selected from the group consisting of ethanol, isopropanol, n-propanol, n-butanol, sec-butanol, t-butanol, ethylene glycol and combinations thereof.

28. The process of claim 23, wherein the surfactant is a non-ionic surfactant selected from the group consisting of polyoxyethylene oxides-propylene oxide-polyethylene oxide triblock copolymers, octaethylene glycol monodecyl ether, octaethylene glycol monohexadecyl ether, and combinations thereof.

29. The process of claim 23, further comprising adding an acid or base catalyst to the

sol gel precursor prior to deposition of the sol gel precursor.

30. The process of claim 23, wherein the oxidizing environment is a plasma comprising a reactive oxygen species.

31. The process of claim 30, wherein the reactive oxygen species is ozone.

32. The process of claim 23, wherein the oxidizing environment is maintained at a temperature between about 200°C to about 400°C.

33. The process of claim 23, wherein the oxide film is exposed to the oxidizing environment for about 30 to about 300 seconds .

34. The process of claim 23, wherein the mesoporous oxide film exhibits a dielectric constant between about 1.6 and about 2.2.

35. The process of claim 23, wherein the mesoporous oxide film has a porosity of at least 50%.

36. The process of claim 23, wherein the mesoporous oxide film is cured at a temperature between about 50°C to about 450°C.

37. The process of claim 34, wherein the mesoporous oxide film is cured between about 1 minute to about 10 minutes.

38. The process of claim 23, further comprising silylating the mesoporous oxide film to render the mesoporous oxide film hydrophobic.

39. The process of claim 38, wherein the silylating the mesoporous oxide film is performed by a slylating agent selected from the group consisting of tetramethyl disilazane (TMDS), hexamethyl disilazane (HMDS), dimethylaminotrimethyl silane, and

combinations thereof.

40. The process of claim 39, wherein the silylation process is performed at a temperature between about 25°C to 200°C.

41. The process of claim 40, further comprising depositing a capping layer on the mesoporous oxide film.

42. The process of claim 41, wherein the capping layer is comprised of materials selected from the group consisting of silicon nitride, silicon dioxide, silicon oxynitride, amorphous silicon carbide, and combinations thereof.

43. A process for forming a mesoporous oxide film on a substrate, comprising:

a) introducing a substrate into a chamber;

b) depositing a sol gel precursor on the substrate to form an oxide film, the sol gel precursor comprising a silicon/oxygen compound, an organic solvent, water, and a surfactant; and

c) removing the organic solvent, water, and the surfactant from the oxide film by heating the film at a temperature of about 200°C to about 450°C in an inert atmosphere to form a mesoporous oxide film.

44. The process of claim 43, wherein the mesoporous oxide film comprises a structure of interconnected pores of uniform diameter.

45. The process of claim 44, wherein the mesoporous oxide film further comprises a cubic phase structure.

46. The process of claim 43, wherein the silicon/oxygen compound precursor is selected from the group consisting of tetraethylorthosililate, tetramethoxy silane, phenyltriethyloxy silane, methyltriethoxy silane, and combinations thereof.

47. The process of claim 43, wherein the organic solvent is selected from the group consisting of ethanol, isopropanol, n-propanol, n-butanol, sec-butanol, t-butanol, ethylene glycol and combinations thereof.

48. The process of claim 43, wherein the surfactant is a non-ionic surfactant selected from the group consisting of polyoxyethylene oxides-propylene oxide-polyethylene oxide triblock copolymers, octaethylene glycol monodecyl ether, octaethylene glycol monohexadecyl ether, and combinations thereof.

49. The process of claim 43, further comprising adding an acid or base catalyst to the sol gel precursor prior to deposition of the sol gel precursor.

50. The process of claim 43, wherein the inert atmosphere comprises a non-reactive gas selected from the group consisting of nitrogen, helium, argon, and combinations thereof.

51. The process of claim 43, wherein the mesoporous oxide film is formed by annealing the oxide film at a temperature between about 400°C to about 450°C.

52. The process of claim 43, wherein the mesoporous oxide film is annealed for about 30 to about 300 seconds.

53. The process of claim 43, wherein the mesoporous oxide film exhibits a dielectric constant between about 1.6 and about 2.2.

54. The process of claim 43, wherein the atmosphere comprises an oxidizing environment of reactive oxygen species.

55. The process of claim 54, wherein the oxidizing environment is maintained at a temperature between about 200°C to about 400°C.

56. The process of claim 55, wherein the oxide film is exposed to the oxidizing environment for about 30 to about 300 seconds.

57. The process of claim 43, further comprising silylating the mesoporous oxide to render the film hydrophobic.

58. The process of claim 43, wherein the silylation process is performed with a slylating agent selected from the group consisting of tetra-methyl-di-silazane (TMDS), hexamethyl disilazane (HMDS), deimethylaminotrimethyl silane, and combinations thereof.

59. The process of claim 43, wherein the silylation process is performed at a temperature between about 25°C to 200°C.

60. The process of claim 43, further comprising depositing a capping layer on the mesoporous oxide film.

61. The process of claim 60, wherein the capping layer is comprised of materials selected from the group consisting of silicon nitride, silicon dioxide, silicon oxynitride, amorphous silicon carbide, and combinations thereof.